

# THE ADAPTATION POSSIBILITIES OF SUSTAINABLE PRODUCTION SYSTEM BEST PRACTICES TO THE HUNGARIAN RURAL ENVIRONMENT – CASE STUDY OF AN ENERGY PRODUCTION BUSINESS MODEL<sup>1</sup>

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## Abstract

The current paper describes a business model that contributes to people's self-sufficiency in the field of energy production. The current society is in a position to depend on decision makers and companies in terms of used energy resources and their prices. Though renewable energies have become popular lately, many people face obstacles in order to employ them. The aim of the research is to introduce a business model which answers this customer need and could be interpreted to different economic circumstances. The presented business model has been elaborated according to the recent Dutch business environment as a green entrepreneurial start-up. This study deliberately avoids the detailed description of the business plan and rather highlights the core concept based on business modelling principles. This form of demonstration equips future entrepreneurs to adapt the model to certain conditions. The main message of this article is the matching pain-gain relations of certain social groups. On one hand, the local communities seeking to go energy independent. On the other hand, people who would like to conduct impact investment.

**Keyword:** *business model, impact investment, REScoop, community energy, energy democracy*

**JEL Classification:** *Q40, Q42*

**LCC:** *HT51-1595*

*“Teach a man to fish  
and you feed him for a lifetime.  
Teach a man to fish sustainably  
and you feed generations to come.”  
- Sigurdur Ingi Jóhannsson*

## Introduction

The current study represents the final phase of a wide research which delves into good governance practices through public service development. The present paper belongs to the environmental area of that programme. In the previous stages, mostly theoretical overviews have been presented regarding the dependence of rural societies on centralized and global production systems. The former papers described many aspects of this matter and focused on the introduction of potential solutions. Many of them urges the return to local production systems and markets (Korten, 1995; Shuman, 2000; Brown – Miller, 2008; Cortese, 2011). In case of industrial products, some finds the upcoming fourth industrial revolution the way out of this dependency (Lasi et al., 2014; Stock – Sliger, 2016). It is expected to enable people

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becoming self-sufficient in the field of production (Ritzer, 2015) or at least to exclude unnecessary actors from the supply chains (Rifkin, 2014). In the world of digitalization and rapid technological development, the nature of commerce is forced to alter too. A serious bottleneck in spreading these technologies is that a major part of society has only a limited access to them. This is mainly due to financial, regional or transparency reasons. Therefore, the challenge of modern businesses is to adapt to novel distribution channels or to create new ones in order to reach customers (Amit – Zott, 2012). As this phenomenon seems to significantly define market competitiveness, the followers of neglected causes have also turned to it. This is how the concept of social entrepreneurship was born (Mort et al., 2003; Choi – Majumdar, 2014). The concept applies to initiatives extending their value proposition towards social and environmental segments (Fogarassy et al., 2017a). Innovative business models enable people to gain access to goods that normally would not be available for them.

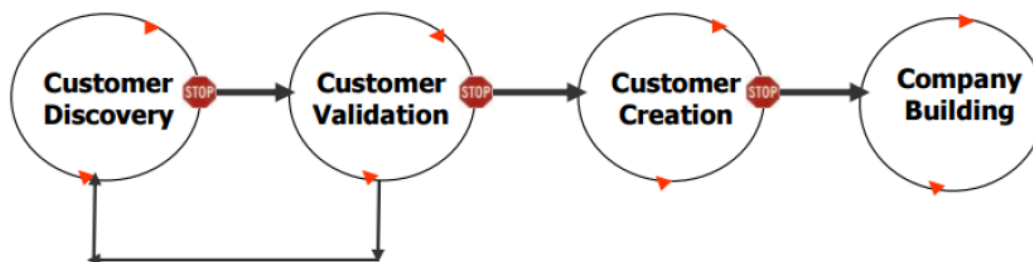
This article describes how a business model could contribute to self-sufficiency in the field of energy production. The current society is in a position to depend on decision makers and companies in terms of energy utilization (Magda, 2011). Though renewable energies have become popular lately, many people face two major obstacles in order to employ them. Some does not own real estate, thus not allowed to install renewable capacity. Another part simply lacks the financial background. The concept of the Renewable Energy Source Cooperative (REScoop) allows social groups (e.g. individual, NGOs) to form a legal entity which can commonly implement renewable energy projects (Rijpens et al., 2013). It enables them to determine their own electricity prices and to choose applied energy sources. The members of the REScoop become “Prosumers” who produce electricity for their own consumption (Tarhan, 2015). It is a bottom-up initiative and the organization operates under social ownership. The local communities could be utterly energy independent from big companies which phenomenon is referred as “energy democracy” (Martinez, 2017). The current study steers its focus on the REScoop initiative and presents a business model which have been built to raise funds for similar projects. It is quite specific since it has been elaborated to Dutch circumstances. However, the article avoids the detailed introduction of the whole business planning mechanism and rather highlights the core concept based on business modelling principles. This demonstration equips future entrepreneurs to interpret the model to certain business circumstances and even to rural environments. The research chapter explains the basic business idea and shows how it relates to current market needs. Moreover, it elaborates on the business model and on the mechanism of the employed activities. The result section indicates environmental impact outcomes based on the calculation of an assumed 5-year function of the business.

### **Research materials and methodology**

The present study applies to a basic business modelling methodology to define several aspects of the initiative. First, it demonstrates the market viability of the business as it indicates the market niche it tends to answer. Then, it explains the core idea of the business. A part of the materials describes the combination possibilities of wind and solar energy. This technological pattern is not necessary in order to further interpret this business model to other environments. It is only demonstrated in this article because it was an element of the original case study. Later, the business and customer relations will be explained which will be followed by the picture of the whole business model. The research avoids the explicit elaboration of business planning elements (e. g. financing, marketing etc.) since they are not relevant in its adaptation to different economic circumstances. It only aims at highlighting the essential foundations of the business to offer its transferability.

### *The practicability of the business*

Many businesses fail at offering something that does not have a demand on the market. It is a basic malfunction to provide solution to problems that does not even exist. Thus, step zero before starting to plan a business is to locate an essential need which would deliver customers (Figure 1).



**Figure 1. Schematic overview of the Customer Development Model**

*Source: Blank, 2012*

Currently, intangible community capital is undervalued and underutilised throughout Europe which applies for western countries as well. Therefore, a lot of community groups look for new ways to leverage this value for new assets. On the other hand, private investors – even with the aim of gaining social or environmental impact – want low risk, transparent ESG investment<sup>2</sup> portfolios, with clear impacts. By enabling them to value the intangible capital and clearly demonstrating the business concept, the risk could less than is normally considered, and through innovation intermediation the return can be higher. The introduced business model creates value for both community groups and investors by leveraging intangible community capital. The presented business model offers bespoke renewable energy solutions for community groups, with a focus on personal connections with investors. It tends to operate as an innovation intermediary transferring innovative technological solutions. The idea of energy independent communities comes from Greece. Still, according to field studies, even Greek people tend to look for best practices in northern countries regarding implementation matters (Fogarassy et al., 2017b). Based on their opinion, they lack the skills and most importantly the trust needed for the realization of this concept. Therefore, the significance of an appropriate consultancy activity is still undiscovered on the market and that gives relevance to businesses focusing on that. To investors, ESG investments would be offered with personal connection and involvement, with transparent impacts, community value creation and environmental benefits.

### *The business idea*

The idea – based on the elaborated problems – is to start a peer-to-peer (P2P) investment<sup>3</sup> platform which functions as an innovation intermediary providing technological transfer in the field of hybrid renewable energy projects. The business targets two different groups of clients. Firstly, it aims to cooperate with local communities which are located near to a wind energy instrument. These communities could express their need for energy security and contribute to

<sup>2</sup> The acronym „ESG” means the three focus points (Environmental, Social and Governance) of investments which aim at the realization of social or environmental benefits (Duuren et al., 2016).

<sup>3</sup> Peer-to-peer lending applies to the movement when individuals invest into the notes of other members of the society without the involvement of traditional financial intermediaries (Yum et al., 2012).

the production of wind farms. The energy production of the farm could work on higher efficiency with an increased capacity by combining it with solar energy. The name of the business is based on the combination of the name of the two energy resources: Wind and Solar Energy Investment (WISEInvest in short). The combination of certain RES is a growing market and this initiative offers the required knowledge and skills for it. A major obstacle for the targeted communities is the financial background to develop a complementing RES project. In their case green banks are not always an option. Not everyone could afford to risk personal financial security with going to any banks for that reason. Therefore, a smart financing solution like peer-to-peer investment would work properly in this situation due to its more flexible and personal approach. Based on the elaborated aspects, the current business model aims to secure the energy security of local communities with providing them the knowledge they lack and the financial support. Moreover, the second target group obviously are investors with the intention of investing in RES projects. This group is proposed with several values. An important aspect is that a lot of people transfer money anyway to certain communities (e. g. schools etc.). With this investment platform, their effort can be turned from pure charity into a financially profitable endeavour. Many impact investors<sup>4</sup> are not able to quantify the environmental and social benefits derived through their portfolio choices (Burand, 2015). The presented platform will be designed in a way to give transparent, reliable information regarding each project, with professional, certified evidence regarding financial returns, energy generation, and environmental and social impacts.

Therefore, potential investors make decisions with a prominent level of confidence and security in their decisions. Furthermore, WISEInvest provides an Escrow service to take the responsibility of being a third party and get a hold over the money until the necessary amount of investments is raised. According to the Alibaba model, firstly it promises the amount of funds. Then, the business only receives a certain percentage of that, until the required funds are all gathered. The elaboration on the business idea has already mentioned certain elements that are not parts of the offered products or technology (e. g. peer-to-peer investment, Escrow, Alibaba model). It represents the current trend in business planning which prefers to focus on the structure of businesses. A novel requirement of the 21<sup>st</sup> century is that businesses must go further than the simple application of incremental innovation. This form of innovation focuses only on the used technology or the improvement of the products itself (Souto, 2015). The new phenomenon is rather the innovation of the business model itself. It concentrates more on the way how customers are reached, and products/services are sold rather than its production. A well-known example for that is the freemium model which gives its products for free but then offers paid extension services for premium customers (Liu et al., 2014). Although, this study aims at presenting a business structure, that initiative includes also incremental innovation. It is the combination of wind energy with solar capacities which has been a controversial field regarding renewable developments. This matter requires the clarification of the problem before the introduction of business model.

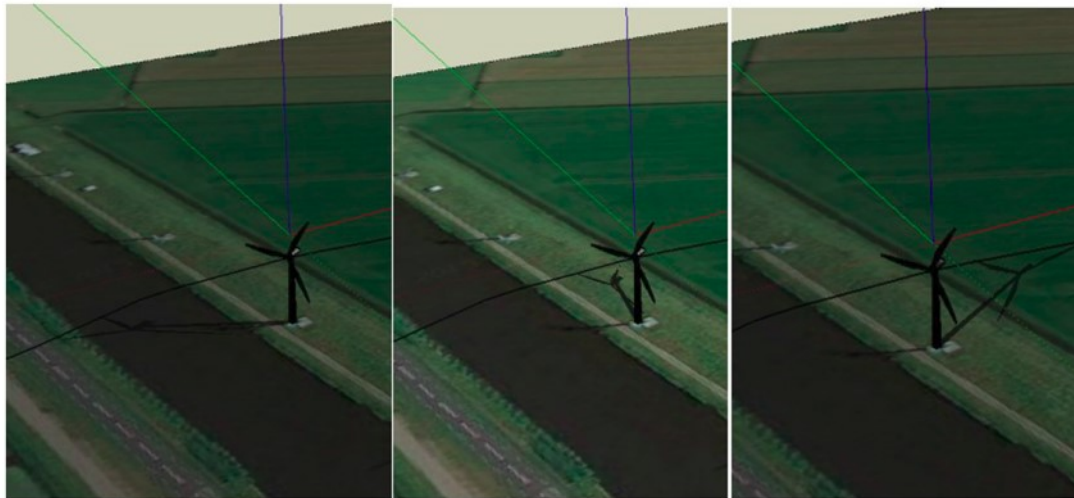
### ***The innovation behind the business***

There are technical concerns about the shading effect of the wind turbine tower and blades on the solar panels as well as the capacity handling through the existing grid. Taking these aspects into account, the initiators of the business conducted a real-time simulation on a Dutch

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<sup>4</sup> Impact investors invest into initiatives that generate social or environmental benefits in addition to financial income (Hebb, 2013).

windfarm. It showed out that the effect of shading only affects 2.4 % of the total annually generated electricity by the solar panels (Figure 2).



**Figure 2. Solar simulations throughout one day based on the site**

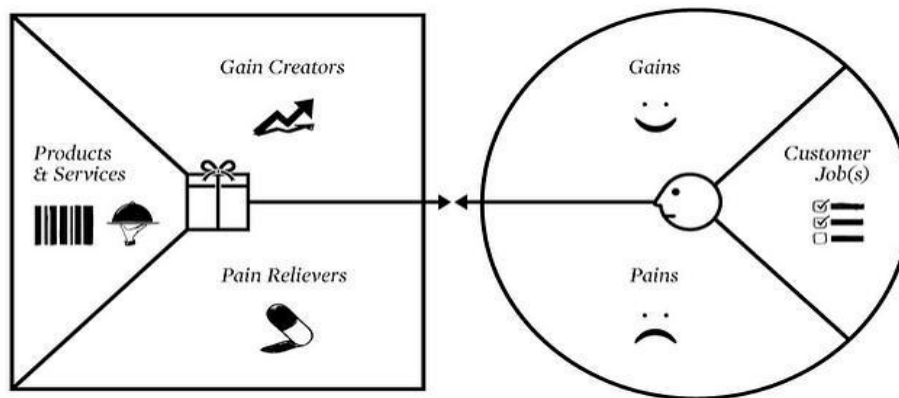
*Source: Self-made, 2019*

The figure indicates that there are no significant losses due to shading of the wind turbine tower and blades. Besides that, the new generation solar panels are fabricated with more bypass diodes which enable the current flow from one cell to another, even if there is shading on some solar cells. The concerns about the electricity supply to the existing grid have also been considered. Since solar energy is mainly produced during the day, it complements the wind energy as it is mainly generated during the night. Nowadays, there are even companies providing smart-software which optimizes the energy supply to the grid, so that overcapacity of the grid can be prevented. Technical feasibility studies have shown out that combining solar PV electricity generation on existing wind farms is very promising (Arabali et al., 2013), as long as the land is not used for agricultural purposes. Moreover, it saves additional grid operation and installation costs and can be a very good solution for intermittency. The uniqueness lies in the fact that it is technically feasible and can generate additional amount of electricity per unit of area.

The elaboration has showed an initial business idea based on regular social and environmental problems. The introduction of the technological innovation was important not only for the demonstration of applicability. This way of renewable energy combination is also the part of the business model as it answers certain needs. However, these are not direct customer demands, but additional welfare benefits which are unique points of social or green businesses. In the highly dense cities of Europe it is becoming an issue how to be efficient with land-use. As most wind farms are installed outside the city, they are either built on agricultural land or previously unused land. A complementary aim of the proposed business idea is to minimize the land-use per installed capacity of renewable energy utilization. As the initiative has been developed for Dutch circumstances, it is obvious why the land-use optimization comes significant. The similar features in business planning are called “pain and gain relations” (Oosterwalder – Pigneur, 2010). It focuses on the nature of needs from the customer sides and the way how businesses can answer them. The next chapter refers to the beginnings when the market validity of the WISEInvest initiative was introduced and presents a more detailed pain and gain linkage.

### ***Pain-Gain relations***

Nowadays, in case of community investments only tangible assets are valued. Concerning the investors aspect, P2P investing mainly focuses on loans, and is seen to have a high risk-return ratio. The introduction of community based renewable energy projects to P2P investment portfolios solves the pain of two different customer segments and creates higher value for them than an individual approach. The first target group is local communities in the need of energy security and independence. The second is investors with the intention to invest in projects with not only financial but also social or environmental benefits. In business model planning, these aspects are considered as customer pains which must be relieved by the products or services of the business (Figure 3).



**Figure 3: The Value Proposition Canvas**

Source: Oosterwalder – Pigneur, 2010

The following description shortly details the value proposition elements of the WISEInvest based on the model pictured on Figure 3:

- **Products and Services:** the business provides an online public investment platform. Another service that flows out of this: the involvement of local communities in the project realisation.
- **Gain Creators:** internet investment platform; cooperation with existing local wind farms; expansion of solar parks on existing wind farms.
- **Pain Relievers:** providing clients (investors) relatively higher interest rates on the investment made and at the same time stimulating the renewable energy development in the country.
- **Customer Gains:** relatively high annual interest rates from investments; local involvement of communities in achieving energy democracy.
- **Customer Pains:**
  - *Low interest rates from local banks:* The average interest rates natural persons would get from their savings account in Europe would be maximum 2% annually.
  - *Lack of involvement of communities in local projects:* Various protests of local communities in deployment of renewable energy projects, show out that these groups of persons are not involved in the project realization and therefore are unaware and even afraid of how energy companies will turn their community into.
- **Customer Jobs:** The proposed business is targeting potential investors with reasonable amount of savings.

These short statements might sound a bit too regular, but usually the lack of these aspects would turn into the bottlenecks of a business. The point is not to get too descriptive at this point, only to present a quick overview of the initiative. The planning and the deep elaboration would only start after the clarification of these segments. Since the aim of this study is to introduce adaptable best practices, the next chapters are not going to demonstrate whole market research behind this project. The technical details (e. g. finances, marketing strategy, risk analysis etc.) were specifically made to Dutch circumstances. The purpose of this work is to show a business model that could be further developed and interpreted to the Hungarian business model. The following section is about the description of the business structure.

### ***Business system and organisation – key activities and partners***

After all the elementary pillars of the business are settled, the most important part is to define the value proposition. That offered product or service must be distinctive pattern considering the competition. The basic value proposition of WISEInvest was to offer customers a higher interest rate (11%) in comparison to what banks (2-3%) and even other renewable energy investments offer (7-8%)<sup>5</sup>. The unique selling point which differentiates this initiative from other platforms is that it only works with solar installations that are implemented on already existing wind parks. This combination avoids the installation costs of the grid and optimize the land use for renewable energy utilization. These saved costs enable the business to offer higher interest rates than other renewable investments. For the cooperation, WISEInvest offers the windfarm 5% of the price of the electricity generated by solar panels which is an attractive benefit for only letting it use its infrastructure. Obviously, not all the wind parks are suitable to host a similar project. In case of the Netherlands, there are approximately 40 objects with the suitable capacity without conducting agricultural activity below the wind turbines. The other customer segment of the business is the local communities surrounding the potential wind parks. As a part of the activities, WISEInvest would form local energy cooperatives (REScoops) from social groups who tend to be energy independent. All the renewable projects would be implemented within the framework of the certain cooperatives. The role of the business is to provide them professional consultancy in order to build, finance, develop and manage themselves. Outsourcing the ownership of the projects and taking only the role of the fundraisers further decreases the risks. The core idea is to connect investors to solar PV projects with an online P2P investment platform. The revenue stream consists of two income sources. On one hand, WISEInvest provides consultancy and advisory services to local community groups aiming to establish innovative hybrid renewable capacity. On the other hand, it sells investment opportunities in these projects to private investors. So, the revenue stream is based on commissions from the amount of the gathered investments and from the electricity generated by the projects through their lifetime.

The main business steps are summarized in the followings (and concluded on Figure 4):

- ***Step 1/A: Partnering windfarms:*** WISEInvest is responsible for finding potential windfarms and for conducting a feasibility study to conclude if their land is suitable for the implementation of a project. The windfarm receives 5% of the electricity price generated by the hosted solar panels.
- ***Step 1/B: Get in touch with local communities:*** Targeting municipalities, schools, households and already existing communities in the proximity of the windfarm which would like to be energy independent. This movement assures the later investors that there will be a legal entity that will own the project in long term.

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<sup>5</sup> Both bank and private investment data are based on recent market circumstances.



- **Step 2: Formulation of a Renewable Energy Cooperative (REScoop):** Conducting a consultation activity to gather local stakeholders (e. g. NGOs, businesses) and form a legal entity which could later function as the owner of the project.
- **Step 3: Advertisement based on market research:** Targeting people with reasonable disposable income or savings as possible future investors.
- **Step 4: Raising funds:** Creating an online P2P investment platform that will be the key resource of the business. After the funds are raised, WISE investment receives a 5% commission fee based on the amount.
- **Step 5: Installation of solar panels:** Contacting a solar company to install solar panels with 1 MW capacity.
- **Step 6: Producing and selling electricity:** 2.4 GWh produced electricity per year. WISEInvest receives 10% commission from the electricity price generated by the solar panels as consultation fee.
- **Step 7: Paying the investors:** 11% interest rate for the investors during project lifecycle (15 years).

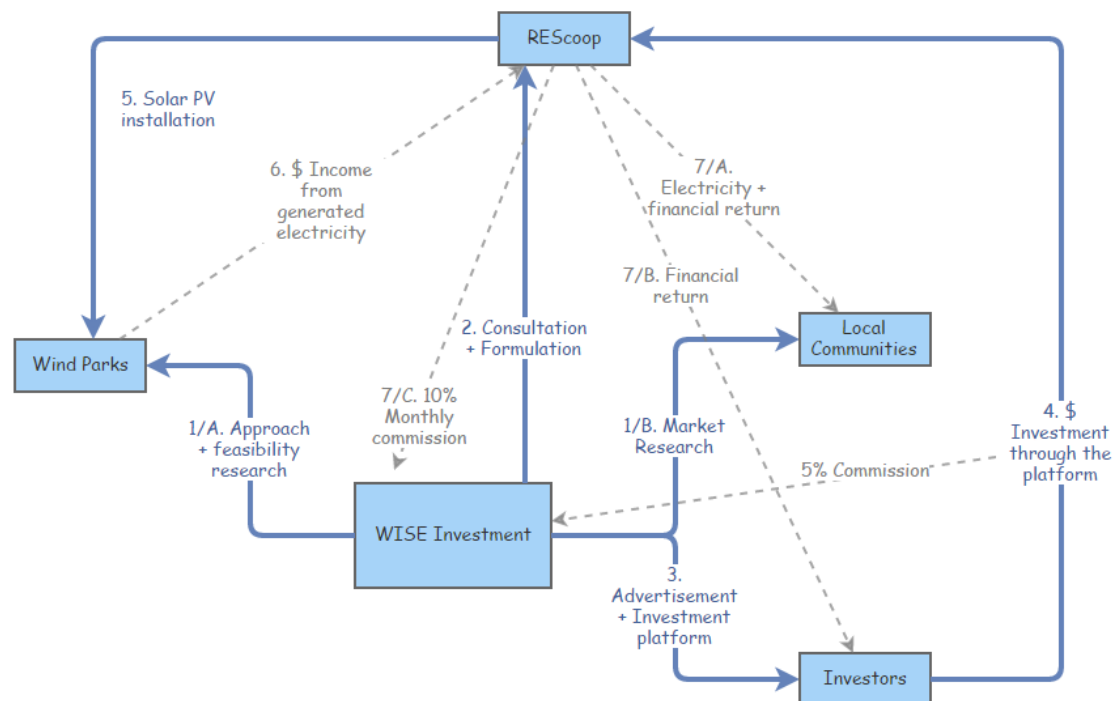


Figure 4. The business structure of WISEInvest

Source: Self-made, 2019

## Results and discussion

The presented business model has been elaborated according to the recent Dutch business environment as a green entrepreneurial start-up. This study deliberately avoided the detailed description of the business plan since it would include an extended market research. The aim of the paper was to introduce a business model that could be interpreted to rural environments. The combination of wind and solar energy or other hybrid renewable energy capacity is not even required. The main message of this article was the matching pain-gain relations of certain social groups. On one hand, the local communities seeking to go energy independent. On the other hand, people who would like to conduct impact investments. The basic activity of a British consultancy company, the Mongoose Energy focuses on this simple aspect without RES



combination. It is a quite successful business which contributes a lot to the environmental and social improvement of the country. However, for the demonstration of the sustainability effect, a theoretical estimation has also been carried out for the 5-year function of the elaborated business. The rest of this chapter is going to present the environmental impacts of that projection. According to the previously described business strategy, the estimation involved the implementation of 8 solar energy plants in the first 5 years of operation. This number is considered reasonable, neither too ambitious, nor that pessimist. The plan is to install 1 MW capacity at each location which produces 2,4 GWh electricity in 1 year. Thus, this amount is defined as the basic business unit regarding the climate impact measurement.

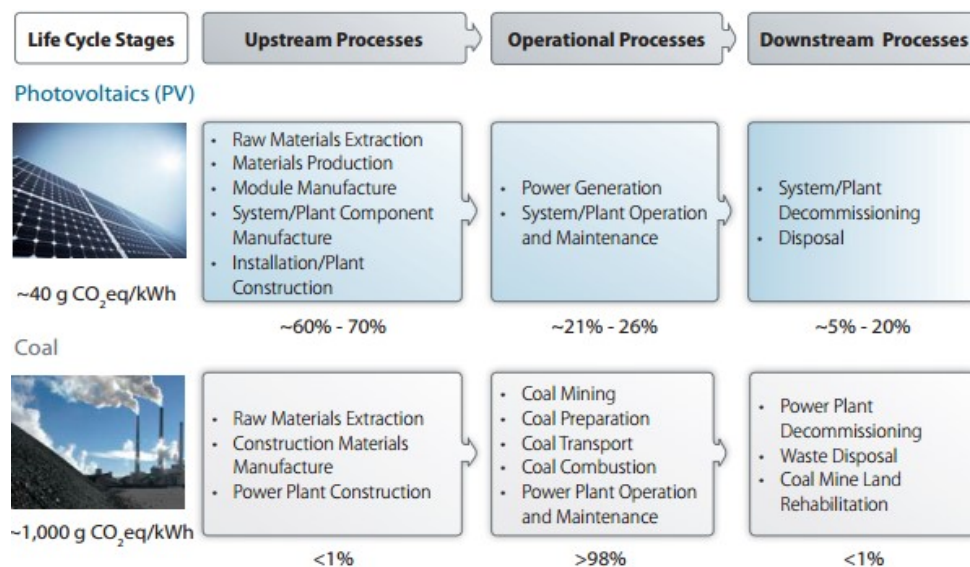
### *Environmental impacts of the initiative*

The business idea introduced by the WISE Investment tackles several climate related and environmental issues to mitigate the effects of climate change. The calculation of the presented by impacts presented have been carried out by the Carbon Footprint Forecast tool of the European Institute of Innovation and Technology's Climate Knowledge Innovation Community (EIT-Climate-KIC). Since the objective of the initiative is to accelerate renewable energy investments and to support the implementation of the projects, the activity saves a significant amount of CO<sub>2</sub> emissions in comparison with the fossil fuel-based production.

The most important climate and environmental impacts of the project:

- Reduction of over 20 tonnes of CO<sub>2</sub>e emissions
- Increasing the amount of electricity generated from renewables by 43,2 GWh
- Land use optimization in case of renewable energy generation/m<sup>2</sup>

Unlike other solar PV projects, this one enables users to prevent environmental pressure at certain points of the lifecycle. Figure 5 illustrates that in case of the solar panels most of the greenhouse gas emissions occur at the beginning and at the end of their lifecycle.



**Figure 5. Environmental impact comparison of photovoltaics and coal energy plant lifecycles**

Source: NREL, 2012

The combination of solar panels with existing windfarms is not only an important feature in terms of financial but also in environmental efficiency. First, it avoids the installation of the grid which leads to emission savings normally spent on manufacture and transportation:

Production stage:

- Less transport (truck): -11,4 kg CO<sub>2</sub>e/business unit
- Less energy (diesel combustion): -49,909 kg CO<sub>2</sub>e/business unit
- Less materials (copper wire): -3059,21 kg CO<sub>2</sub>e/business unit
- Less processes (non-ferro): -27,65 kg CO<sub>2</sub>e/business unit

Based on the calculations the innovative hybrid utilization reduces the carbon footprint of solar panel installations by 3148,169 kg CO<sub>2</sub>e/business unit only in the initial stage of the lifecycle. In 5 years, it means a 56665,042 kg CO<sub>2</sub>e reduction altogether. Even though this is already an imposing number, the most remarkable results appear during the operational period. Meanwhile, in case of the production the implementation method was compared to other solar PV projects, this period includes the avoided GHG amount in comparison with fossil fuel scenarios.

Operational stage:

- Using renewables instead of the Western European Industrial country mix standards result in more than 131 tonnes of CO<sub>2</sub>e reduction/business unit.

This number indicates that the major amount (over 20 tonnes of CO<sub>2</sub>e) of the avoided CO<sub>2</sub>e emissions come from the renewable based electricity generation.

### ***Other environmental impacts***

Besides the most important carbon footprint indicator the Climate Impact Tool highlighted other monetarized effects of the operation which is presented below by the eco-costs:

- Human health: -8034,5 Euro/business unit
- Eco-toxicity: -39 714,75 Euro/business unit
- Resource depletion: 1986,34 Euro/business unit

In accordance with the introduced values, the avoided costs amount to -859486,5 Euro while the activity only causes 35 754 Euro worth of losses regarding depleting resources. However, the latter effect is inevitable in case of energy utilization but the fact of using renewables minimizes the required deadweight loss.

### **Conclusion**

The presented business model described the establishment procedure of a Renewable Energy Source cooperative (REScoop) which is expected to result in beneficial social impacts. The REScoop model answers several social problems offering multiple benefits beyond the economic and environmental gains. Considering the overview of the current energy supply system, the first conclusion to be drawn is the insecure state of consumers towards their uncertain future of acquiring energy. As a consequence of the monopolistic energy system, the supplier side significantly dominates the pricing of the provided electricity. Therefore, a major portion of the living costs comes from the money spent on electricity bills. Furthermore, the government also has a high influence on future strategies regarding the sources used for energy generation. Thus, the society is in a position to depend on top-down decision making in terms of used energy resources and electricity prices.

The concept of the REScoop model was built around the previously elaborated social need allowing the society to determine their own electricity prices and giving them the freedom of choice considering the utilized energy source. The basic idea is to recognize a certain group of citizens as a legal entity which is able to commonly invest in renewable energy projects. And this is the point where the multiple benefits of the system occur. First, the members of the REScoop – mostly natural people – would be able to become so-called “Prosumers” who produce electricity for their own consumption. Since it is a bottom-up initiative, the organization operates under social ownership and the people can decide about the type of the desired energy resource. So, the local communities could be utterly energy independent from big companies and able to realize the notion of energy democracy.

Regarding future research perspectives, an interesting area would be to examine how such initiatives change the social attitude towards renewables and environmental issues. The point of the whole REScoop model is that it offers economic benefits for following sustainable disciplines. Previous market research have shown that people who invest in renewable energies are driven by economic motives and not by the intention of natural preservation. Thus, it is an essential requirement in the field of sustainable development to offer business solutions and models which are competitive on the market.

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